

Fighting frustration by all means!

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Abstract

A combination of frustrating interactions and high symmetry can lead to a large degeneracy of the ground state in a spin system. This situation is exemplified by antiferromagnets on the kagome and pyrochlore lattices. The degeneracy, on the one hand, suppresses magnetic order and produces a strongly correlated liquid state, whose low-temperature properties arouse considerable interest. At the same time, a large degeneracy means strong sensitivity to all sorts of perturbations. Coupling of frustrated spins to various nonmagnetic degrees of freedom often makes the spin liquid unstable. I will discuss two examples of such behavior in antiferromagnetic spinels. In zinc chromite, the valence-bond order parameter couples to lattice vibrations causing a discontinuous spin-Peierls transition. A series of spinels with vanadium exhibits a sequence of two phase transitions from a paramagnet to the Neel state with an intervening phase that has coexisting orbital and valence-bond orders.